THE SCAPULO-HUMERAL REFLEX OF VON BECHTEREW.

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The discovery of the clinical significance of the knee-jerk, by Westphal and Erb, was probably the greatest single step in neurological diagnosis ever made. It remains and probably will remain, the pre-eminent reflex; for in any brain-lesion, and in any lesion of the upper part of the cord, the knee-jerk reveals practically all that any cord-reflex can reveal; and in lesions of the lower part of the cord the lumbar region is involved in the majority of cases.

No reflex in the upper part of the body,—even if one were found as constant as the knee-jerk—can therefore be expected to equal the knee-jerk in clinical importance.

Apart from this consideration there is a law in neurophysiology which forbids us to hope that any reflex having its center in the cervical cord can speak as clearly of conditions in this part of the cord as the knee-jerk does of conditions in the lumbar enlargement. This law relates to the inhibitory control exercised by the brain over all reflexes, and is to the effect that the nearer we approach the brain, in testing reflexes at successive levels, the greater is this checking influence and the less distinct the reflex action. However, so much do we feel the need of additional means for diagnosis when affections of the cervical cord are under consideration, that any new suggestion is welcomed, and should be given a conscientious trial, even in the face of theoretical discouragements.

In the *Neurologisches Centralblatt* of March 1, 1900, von Bechterew announces a new reflex having its center in the cervical enlargement of the cord. He gives to it the name *scapulo-humeral reflex*, and claims for it a constancy greater than that of the biceps and triceps jerks or the scapular and palmar cataneous reflexes. This new reflex, the author says, "is elicited by the percussion-hammer along the entire inner edge of the shoulder blade beneath the inner angle of the same—most markedly however, at the inner edge of the scapula near the augulus inferior. It consists chiefly in adduction of the corresponding humerus toward the trunk, often also in slight outward rotation, mainly produced by contraction of the infraspinatus muscle, and apparently of the teres minor. Not rarely, however, by extending to the deltoid and flexors of the fore-arm (especially the biceps) the usual reflex leads to abduction of the arm and to slight flexion in the elbow joint."

Von Bechterew then enumerates the conditions which affect this reflex. Briefly, it is absent in poliomyelitis, in the spinal form of progressive muscular atrophy, and in neuritis, when the shoulder-girdle muscles are affected; it is diminished or absent in muscular dystrophy and in "rigidity of the spinal column;" it is exaggerated in cerebral hemiparesis or hemiplegia, especially when there is marked atrophy of the shoulder-girdle muscles. So in determining whether such atrophy be of spinal or neuritic, or of cerebral origin, in a given case, the state of the scapulo-humeral reflex is "significant."

Haenel, in the same journal, of the date May 1st, 1900, reports results of testing for this reflex in 120 normal subjects, with his conclusion that the scapulo-humeral, while a true and serviceable reflex, yet ranks below those of the triceps, radial-periosteum and biceps in constancy, exceeding in this regard only the ulno-periosteal reflex.

Dr. F. X. Dercum suggested to me last August that I study this reflex in the nervous wards of the Philadelphia Hospital, to learn particularly the character and the degree of constancy of von Bechterew's reflex in hemiplegia and in spinal muscular atrophy. I now report my findings in 122 cases, mostly of organic diseases, as follows:

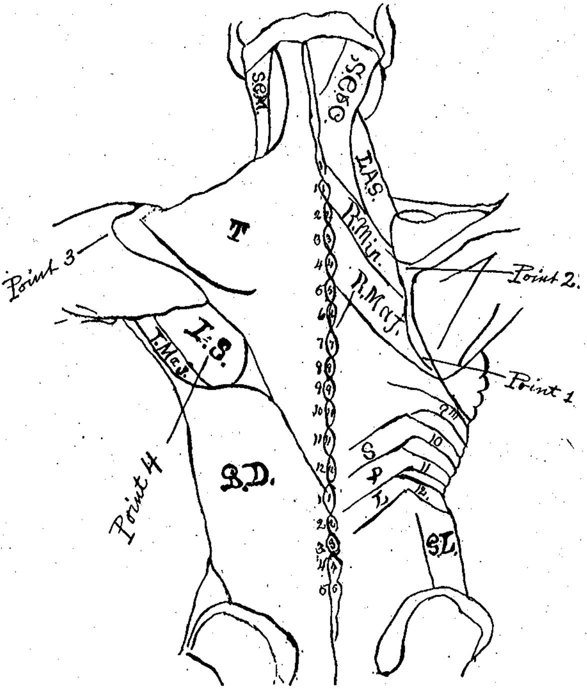
Hemiplegia	71	
(Left—44; right—27)		
Progr. musc. atrophy (spinal)	4	
Locomotor ataxia	9	
Cerebro-spin. syphilis	3	
Pott's disease of spine	6	
(Cervical—2; dorsal—4)		
Infantile diplegia	3	
Disseminated sclerosis	7	
Amyotrophic lat. sclerosis	4	
Syringomyelia	2	
Friedreich's ataxia	1	
Crossed paralysis	1	
Pseudo-muscular hypertrophy	1	
Epilepsy	1	
Lead palsy (wrist-drop)	3	
Traumatic monoplegia	1	
Alcoholic neuritis	1	
Thrombosis right axillary artery with pseudo-ankylosis	1	
Left (cerebral) hemianesthesia	1	
Brain-tumor	1	
Paretic dementia	1	122

First, as to the *constancy* of the scapulo-humeral reflex.

There was *no response* on tapping at von Bechterew's point (1 in the diagram) in 40 cases, as follows:

Hemiplegia	14	
(Left 8; right 6)		
Locomotor ataxia	8	
Progr. musc. atrophy (spinal)	4	
Dorsal Pott's disease	2	
Cervical Pott's disease	1	
Disseminated sclerosis	2	
Infantile diplegia	1	
Traumatic monoplegia	1	
Neuritis following axillary thrombosis	1	
Lead palsy	3	
Friedreich's ataxia	1	
Syringomyelia	2	40

Percussing with the hammer at the base of the scapular spine (point 2 in the diagram), where Haenel says "the reflex may be best obtained," did induce a motion when none was obtained by percussing at point 1, in the following cases: on the left side in one case of cervical Pott's and in 3 cases of left hemiplegia. In one of these latter cases a reaction was obtained also at the point of the shoulder (end of acromion—point 3 in diagram). Moreover in 2 cases of right hemiplegia and in one of dorsal Pott's, negative at both 1 and 2, a reaction was obtained at point 3. In one case of left hemiplegia, one of spinal muscular atrophy, one of syringomyelia, one of cervical Pott's, and in the case of "neuritis following thrombosis of the axillary artery," a reaction was obtained by striking the body of the infraspinatus (point 4 in the diagram), and nowhere else: this reaction consisting, in each case, in strong external rotation of the upper arm, apparently due to a direct contraction of the infraspinatus muscle.



All the arm-reflexes were absent, along with von Bechterew's, in the following cases: left hemiplegia 1; progr. m. atrophy (spinal) 3 (except slight wrist-jerk in one); traumatic monoplegia 1; dissem. sclerosis 1.

In the 33 other cases, negative as to the von Bechterew reflex, the biceps and triceps jerks were present in varying degrees of activity, and it was not apparent why the scapulohumeral alone should be abolished.

Still, on von Bechterew's premise this diminution or absence of his reflex might have been expected in the 8 cases of loc. ataxia, 4 cases of spinal musc. atrophy, 1 case of cervical Pott's (perhaps), 1 case of neuritis following thrombosis, 1 case of traumatic monoplegia, 1 case of Friedreich's ataxia, 2 cases of syringomylia; total 18 cases.

Its unexpected absence in the other 22 cases is probably accounted for in the majority as follows:

By extreme atrophy and contracture in 8 instances; athetosis in 2 (hardly); enormous adiposis in 1; incomplete relaxation in 2 demented patients; complicating paralysis agitans in 1.

No explanation was apparent for its absence in 2 cases of hemiplegia, one of disseminated sclerosis, the 3 of lead palsy, and the two of dorsal Pott's disease. On the other hand, in no case was the scapulo-humeral reflex present when it should have been absent. In short, its presence is significant; its absence is an uncertain sign.

Second, as to the components of the scapulo-humeral reflex; that is, the muscles implicated, and the motion of the arm resulting. These showed no constancy. In 48 cases the deltoid could be seen and felt in action; in 48 the biceps—the corresponding motions of abduction of the upper arm and flexion of the forearm being observed. Adduction of the upper arm occurred only 10 times. Rotation of the forearm occurred in 20 cases,—external in 10 cases, internal in 10. Generally this rotation was due apparently to the action of the biceps. Rotation of the upper arm was seen in only 12 cases; external in 6 of these, internal in the other 6. Excitation of even such distant muscles as those on the anterior part of the thorax often took place, the pectoralis major contracting rather strongly in 19 cases. This muscle, indeed, appeared to be dominant in 8 cases, the motion of the arm being adduction in 4 of them, internal rotation in the other 4. In 5 cases the triceps acted, in 4 the trapezius.

The most frequent combination of motions, among all cases, was abduction of the upper—with flexion of the forearm, and a movement of the shoulder blade which I call "adduction of the scapula." This latter phenomenon occurred 36 times. It consists in a jerk of the lower angle of the scapula in the direction of the spinal column, and is probably due to the action of the rhomboid muscles. We may conclude, then, as Haenel did from his study of normal subjects, that the motion which von Bechterew describes as usual, namely, adduction and external rotation of the upper arm, is not so common as is abduction of the upper, with flexion of the forearm, which von Bechterew thought to be only occasional. Von Bechterew's statement as to the differential value of the reflex in atrophies of various origin, is rather indefinite. Shoulder-girdle atrophy of considerable degree was present in 36 cases of my series, and while in 25 of these (hemiplegics), accentuation of the reflex, which generally occurred, and in 6 (4 of progr. musc. atrophy, 1 of cervical Pott's, 1 of Friedreich's ataxia) absence of it—corresponded with von Bechterew's statement; yet in the other 5 cases of atrophy (1 of cervical Pott's, 2 of amyotrophic lat. sclerosis, and 2 of cerebro-spin. syphilis) we see examples of atrophy of cord origin with an active scapulo-humeral reflex. In a case recently exhibited by McCarthy at the Neurological Society, shoulder-girdle and arm-atrophy, due unquestionably to cord-disease at the level of the 5th or 6th cervical segment, was accompanied by exaggeration of the scapulo-humeral and all other reflexes, presumably on account of lateral-tract involvement.

The more precise statement, therefore, would be: in lesions of the upper segment of the motor system (pyramidal tracts), the reflex is increased; in lesions involving the reflex path (peripheral nerves or spinal cord), it is diminished or absent. Thus the scapulo-humeral reflex is an analogue of the knee-jerk (Dercum).

This reflex is less constant than those of the biceps and triceps. It, or a similar reflex may be obtained about as well at the point of the shoulder; it may be elicited at the base of the scapular spine as well as, or even better than, at the lower angle.

Its muscular components are so variable and widespread, the reflex is so complicated and indefinite as compared with the others, that we shall not feel much confidence in any deductions drawn from it until clear post-mortem data shall have established its exact correspondence with a somewhat limited portion of the cervical enlargement.